Slipher, the spectra in this case indicating rotation in 10h. 50m., in a direction contrary to that of the planets nearer the sun. Much attention was at one time given to the search for evidence of absorption due to water vapour in the atmosphere of Mars, first by Doppler effects due to relative motion of the earth and planet, and alternatively by observations of the relative intensities of the atmospheric bands in Mars and the moon. Although measurements of the plates suggested slight displacements, tending to prove the existence of a Martian atmosphere, Lowell frankly confessed that he could place no reliance on this result. On the other hand, Mr. Very's discussion of the intensities of the bands decided in favour of a Martian atmosphere containing water vapour, but this conclusion was not accepted by Campbell.

A further notable contribution to the spectroscopic study of planets was made by a beautiful series of photographs of the spectra of the major planets, showing the progressive increase of intensity of the characteristic planetary absorption bands in passing from Jupiter to Neptune. No satisfactory interpretation of these bands has yet been given, but the photographs provide very definite data for guidance in experimental research relating to them.

The spectroscopic investigations of comets undertaken at Flagstaff have been of more than ordinary interest in consequence of their inclusion of the red part of the spectrum, of which but little was previously known. Much remains to be done in connection with the interpretation of these observations, and in order to facilitate this work Lowell very generously placed copies of the photographs at the disposal of those who were in a position to undertake the necessary experiments. One important result obtained by Lowell, following from simultaneous photographs of the forms and spectra of comets, was that gaseous masses could in some cases be proved to be moving away from the head. This point deserves more attention than it has received. As Lowell put it: "As the incompetency of light-pressure to repel molecules in a comet's tail has been widely published, this observational proof that molecules in such a tail are repelled—whether they can be or not theoretically—is of considerable interest."

Spectroscopic investigations of the spiral nebulæ are extremely difficult and laborious on account of the feeble luminosity, but the Flagstaff observers provided themselves with well-designed instruments and boldly attempted to determine the radial velocity of one of these objects. In the first instance, the Andromeda nebula was found to be approaching the solar system with a velocity of 300 km. per sec., and the suspicion that spirals as a class have much higher velocities than stars has since been abundantly confirmed. The nebula N.G.C. 4594 was, in fact, afterwards found to be not only receding at the immense speed of 1100 km. per sec., but also to have a motion of rotation such that at a distance of 20″ from the nucleus the velocity is 100 km. per sec. These results are clearly of fundamental importance, and would seem to favour the view that the spiral nebulæ are to be regarded as stellar systems outside that to which the sun belongs.

Another difficult investigation undertaken at Flagstaff was that of the constitution of the extremely faint nebulæ surrounding the stars of the Pleiades. It was found that the characteristic lines of gaseous nebulæ were absent, and that the spectrum was identical with that of the associated stars, leading to the conclusion that the nebula shines by reflected starlight. A similar conclusion has since been reached from an investigation of the nebula about ρ Ophiuchi.

Those who have had the privilege of a visit to the Lowell Observatory cannot fail to have been impressed by the ample provision for a wide range of astronomical inquiries, and by the fine display of transparencies representative of the successful results which have rewarded the skill and patience of the observers. The inspiring enthusiasm of Lowell will doubtless be sadly missed in the future, but it is sincerely to be hoped that some means will be provided whereby the activity of the observatory may be maintained. A. FOWLER.

NOTES.

UNDER the new regulations recently made with a view to the control of food supplies, the Board of Trade issued on Monday the following Order as to the milling of flour:—The Milling Order, 1916, fixes for the United Kingdom the percentages of flour that must be extracted from wheat of various qualities according to the following schedule:—English, 76; Choice Bombay, 78; Australian, 78; Blue Stem, 76; Walla Walla, 75; No. 2 Red Western, 76; No. 2 Red Winter, 74; No. 2 New Hard Winter (1916), 76; No. 1 Northern Duluth, 75; No. 1 Northern Manitoba Old Crop, 76; No. 2 Northern Manitoba Old Crop, 75; No. 3 Northern Manitoba Old Crop, 73; Choice White Karachi, 75; Soft Red Karachi, 75; Rosafe, 62 lb., 73; Baril, 61½ lb., 74; Barletta-Russo, 61½ lb., 74. The Order comes into force, as regards milling, on November 27 next; that is to say, on and after that date no wheat may be milled except in accordance with this schedule. On and after January 1, 1917, only flour milled in accordance with the schedule may be used for making bread or any other article of food. A subsequent Order will be issued requiring periodical returns of stocks of wheat received and of flour and offals milled and of all stocks in hand on the date of the Milling Order coming into operation—*i.e.* November 27.

THE statistics given in the half-yearly Review of the Movement of Fertilisers and Chemical Products just issued by the International Institute of Agriculture show very clearly the effects of the war on this branch of industry. Shipments of natural phosphates are diminishing both on account of the scarcity of labour and the high rates of freight. As regards superphosphate of lime, the small supply of raw phosphates and the ever-increasing demand for sulphuric acid for munitions of war have depressed the output in all countries, notably in France, where the latest figures show a decrease of 70 per cent. on the production of 1913. The increase in the exports of Chilean nitrate, which began in the latter half of last year, has continued, so that the figures are now much nearer to the normal than was the case earlier in the war. France is now importing three times as much nitrate as in 1915, and the same applies in various degrees to all the importing countries, but the increased demand is entirely for industrial purposes. The manufacturers of synthetic nitrogenous fertilisers have almost everywhere augmented their output considerably, either by development of existing plant or by new construction. Very little, if any, of the extra supplies are available for agricultural purposes; in some countries the State requirements absorb the whole output. The review includes a useful bibliography of the literature published during the first six months of 1916.

THE issue of the reports containing the scientific results of the Australasian Antarctic Expedition, 1911–14, under Sir Douglas Mawson, has been seriously delayed owing to the war and its effect upon assets, such as the popular book, film, and lectures which it was anticipated would realise sufficient to defray the cost of publication. We are glad to learn, therefore, that the Government of South Australia has come to the assistance of the expedition, and agreed to execute the printing at the Government Printing Office, Adelaide. The New South Wales State Government has also generously agreed to reproduce certain illustrative matter. The production will appear in royal quarto size, similar to like publications of other British Antarctic expeditions. The completed work will be voluminous, and several years must elapse before all is passed through the press. The plan of publication is to divide the subject-matter into the three series, as follows:—Series A, geography, geology, etc.; Series B, physical subjects; Series C, biology. Each series will be subdivided into volumes and parts. Prof. W. A. Haswell, of Sydney University, who organised the programme of the biological section of the expedition, is editing Series C, and has already made arrangements for the working out of most of the groups collected. Three parts, namely, Fishes, Mollusca, and Cephalopoda, are expected to appear this year.

THE death of Mr. Charles Smith, master of Sidney Sussex College, removes a well-known figure from Cambridge, and will be widely regretted. Mr. Smith was born in Huntingdon, and entered Sidney Sussex College as a scholar in 1864, graduated as third Wrangler in 1868, was elected a fellow of the college in the same year, and held the office of tutor from 1875 to 1890, in which year he was elected master on the death of Dr. Phelps. From 1896 to 1909 he was a governor of Eton College. During his tutorship Sidney Sussex increased greatly in numbers, and the influence of his teaching was seen in the successes of his pupils in the Mathematical Tripos. He was indefatigable in his efforts to promote the interests of his college. To him the erection of the new block of buildings there was due, and it was his ambition, unfortunately not realised, to complete the new court by the addition of a further range. To the general public he was best known as the writer of a series of text-books on mathematical subjects remarkable for their clearness of exposition. His books on conic sections and algebra in particular are probably known to most English mathematical students. They appeared at a time when a more thorough, and, at the same time, a more attractive, style of elementary mathematical teaching was greatly needed, and had immediately a large success. In private life Mr. Smith was a great lover of flowers, especially of delphiniums, roses, and chrysanthemums, which he grew in great profusion and with much success in his charming garden at the Master's Lodge.

AN exhibition and sale of water-colour sketches by the late Prof. Silvanus P. Thompson will be held (by permission of the Alpine Club) at the club rooms, 23 Savile Row, W., from November 27 to December 10.

THE Bradshaw Lecture of the Royal College of Surgeons of England will be delivered on December 15 by Col. C. J. Symonds upon "Gunshot Injuries of the Spinal Cord."

THE death on November 18 is announced in the *Morning Post* of November 20 of Mr. J. H. Merivale, the North of England mining engineer, who was secretary to the North of England Institute of Mining and Mechanical Engineers, and formerly professor of mining at Durham College of Science.

Engineering for November 17 contains an interesting article by Prof. Luiggi on the utilising of volcanic heat for power-production purposes. In Central Tuscany, near Volterra, there are numerous cracks in the ground from which powerful jets of very hot steam spout high in the air with great violence and constancy. Early experiments on the use of this steam for driving engines showed that the borax salts, sulphuretted hydrogen, and sulphuric acid present in the steam necessitated frequent repairs on account of the corrosive action. This difficulty has been overcome by applying the steam, not directly in the engine, but to a boiler instead of fuel; steam is thus produced in the boiler at a pressure of two atmospheres, then passed through a superheater, and so to the steam turbine used for driving electric generators. Prince Ginori-Conti, who has financed the undertaking throughout, has been responsible for three large installations on this system. One of the 3000-kw. units has been at work since January, 1916, the second since April, and the third has just been started. So far the first two groups have worked quite successfully, and have been a great boon to the industries of Tuscany, greatly crippled by the scarcity and high price of coal. Since the region available extends for many square miles around Larderello, there is nothing to prevent the system being developed to the production of hundreds of thousands of horse-power.

CAPT. W. B. GOURLAY writes us, from "somewhere in France," a brief but extremely interesting note on a phosphorescent centipede. He discovered the creature in a very unexpected manner, inasmuch as he was putting coals on a dying fire in an unlighted room when he immediately noticed on the coals a gleaming, wriggling object, which proved, by the light of a match, to be "a small yellow centipede." The fact is worth placing on record, since the occurrence of phosphorescence in this group is by no means generally known. Even by specialists, indeed, nothing seems to be known of the matter save that two species of Geophilus possess the power of emitting phosphorescent light; the source and use of the light are yet to be discovered. In one of these, *G. electricus*, the light has been described by Mr. G. S. Sinclair as brilliant, the creature emitting it leaving a trail of bright light behind it which lasts for some time. Of the other species, *G. phosphoreus*, still less seems to have been recorded. It was described by Linnæus on the authority of a Swedish sea-captain, who asserted that it dropped, shining like a glow-worm, upon the deck on his ship when he was sailing in the Indian Ocean a hundred miles from land. From this we may infer that it had been taken on board at the last port of call, and remained concealed, either on the deck or in the rigging, until it at last revealed itself as a "stow-away."

ONE of the most interesting phases of the work which the Young Men's Christian Association is undertaking on behalf of the general welfare of the men of his Majesty's Forces received Royal approbation on Friday, November 17, when H.R.H. Princess Christian opened a microscopical demonstration and conversazione at the Y.M.C.A. headquarters in Tottenham Court Road. Fellows and members of the Royal Microscopical Society, the Quekett Microscopical Club, and the Photomicrographic Society were present with eighty-six microscopes, and the large reading-room, lounge, and drawing-room were filled during the evening with a constant stream of men desirous of viewing interesting objects displayed. In addition, there was a series of lectures and kinematograph displays of living micro-organisms, Mr. F. Martin Duncan lecturing on "Some of Nature's Fly-traps," and Dr. G. H. Rodman giving a talk on "What the Microscope Reveals in a Few Objects of Everyday Occurrence." In introducing her Royal Highness, Col. Sir T. Sturmy Cave said the experiment of microscopical exhibitions was originated by Mr. J. W. Ogilvy, one of the Y.M.C.A. honorary secretaries, and the experiment had been a decided success. Princess Christian then declared the proceedings opened, expressing therein hope that they would be very successful. She afterwards made a tour of the various exhibits, spending more than half an hour among the microscopes, and showed particular interest in the apparatus demonstrating the process of photographing microscopic objects. It is interesting to note that a large number of exhibitions have already been given at the Y.M.C.A. huts in the Home Counties area, and even as far as Salisbury Plain. Great interest is invariably evinced in these as a variation from musical entertainments or kinema shows. The demonstrations deal with germ enemies to be guarded against, and, at the special request of a number of soldiers, special attention has been given to the question of venereal diseases.

A large and enthusiastic meeting was held on November 9 in the University of Sheffield to discuss the formation of a Society of Glass Technology. The widespread interest in the scheme was demonstrated by the presence of representatives of cities as far apart as London, Edinburgh, and Cardiff, whilst every glass-manufacturing district was well represented. Mr W. F. J. Wood, of Messrs. Wood Bros., Ltd., Barnsley, was elected to the chair, and the meeting opened with a cordial welcome from the Vice-Chancellor of the University, Dr. H. A. L. Fisher, who remarked that Sheffield had cause for legitimate pride in the knowledge that its University had been proposed as the headquarters of a society representing such an important industry. He emphasised the fact that this industry, among others, had suffered in the past owing to its detachment, wholly or partially, from its scientific aspects. The formation of the Department of Glass Technology in the University was serving to remedy this state of affairs, and the inauguration of this society was a distinct step in the same direction. Dr. W. E. S. Turner outlined the steps that had led up to the formation of the society, and spoke of the remarkable response from those interested in glass. Expressions of warm approval and promises of support had been received from all over the country. Dr. Turner pointed out that there was no intention of making the society a local institution, but that it was in every way a national one. The report of the Provisional Committee was adopted, and a formal resolution giving actual being to the society was passed unanimously. The following officers were then elected:—*President*, Mr. W. F. J. Wood; *Vice-Presidents*, Mr. S. B. Bagley, Mr. F. J. Cheshire, Sir William Crookes, Mr. A. S. Esslemont, Prof. H. Jackson, Mr. S. N. Jenkinson, Mr. H. J. Powell, Dr. W. Rosenhain, F.R.S., Mr. H. J. Stobart, Dr. M. W. Travers, F.R.S., Mr. Duncan Webb, and Mr. H. S. Williams-Thomas; *Council*, Mr. J. E. Barker, Mr. W. R. Barker, Dr. P. G. H. Boswell, Mr. F. W. Branson, Mr. W. Butler, Mr. F. G. Clark, Mr. J. Connolly, Mr. J. B. Coppock, Mr. J. H. Davidson, Prof. W. G. F. Fearnsides, Mr. J. James Hirst, Mr. F. Swann, Mr. F. P. Wainwright, Mr. A. D. Young; *Treasurer*, Mr. F. Sweeting; *Secretary*, Dr. W. E. S. Turner; *Assistant Secretary*, Mr. C. J. Peddle. It is hoped that the society will receive the support of all those interested in glass, either directly or indirectly. Information upon any points will be gladly supplied by Dr. W. E. S. Turner, the University, Sheffield, who will welcome inquiries and suggestions.

The tendency to ascribe mechanistic principles to animate nature on the evidence of their applicability to inanimate nature, or to postulate a dualism which marks off the animate and the inanimate as lying in two separate realms, is subjected to a searching criticism on scientific grounds by L. M. Passano in an article entitled "Being and Becoming" (*Mind*, N.S., No. 100). He develops a scheme whereby he brings into relationship an atom and an act of will. He contends that the atom implies energy, and that mass is energy or a store of energy due to motion. Energy is life, and to live is to liberate stored-up energy, the liberation of energy being a subjective act. All things are living, the lowest form of life being gravitation. The descending scale of liberation of energy from man to the lower animals, to plants, to radio-active substances, to chemically active substances, to inert substances, the last possessing at least the energy of gravitation, is nowhere delimited. The materialism of W. K. Clifford depends upon his being unaware of radio-active substances, which activity and the facts of chemical affinity render, according to the writer, this point of view untenable. The paper is one involving the fundamental principles of several sciences, and will be interesting to many thinkers.

The *Pioneer Mail* of September 2 gives an account of the Calcutta Health Officer's proposals for the future. We are strongly of the opinion of those who hold that before antimalaria measures are carried out we should determine exactly the malarial or endemic index of the district: (*a*) the anopheline carrier, (*b*) its distribution as shown by a spot map of the occurrence of larvæ. It would then be known what there is to undertake, viz. the eradication of malaria-carrying anophelines. It is difficult to agree with those who prefer to proceed against all mosquitoes. If time and money were no object this method might be permissible, but in Calcutta the proposed outlay for antimalaria measures for 1915–16 is only about five hundred pounds. It is evident that a small sum like this must be spent in a rational way, and not in endeavouring to destroy mosquitoes in "the many scores of miles" of breeding-places in Calcutta. It appears that it was only last year that it was proposed to obtain some of the necessary information to which we have alluded above. With the money available it would seem most practical to treat one area only in which the conditions are fully known and suitable. If the results are successful we believe that the path of the sanitary officer would be a happier one in the future. So far Calcutta has not distinguished itself in this matter.

Once more the formation of a Red Cross Museum is being seriously discussed. The need for such an institution, and the scope of its activities, are briefly and clearly set forth in the *Museums Journal* for November. Such a museum, of course, would appeal only to the expert. But it would provide him with a source of inspiration, and do much towards that standardisation of methods and equipment which is, in regard to many aspects, very urgently needed. A case in point is furnished by the different sizes adopted at the present time for stretchers and for ambulances, so that a stretcher that is brought up to place in an ambulance often cannot be taken in. If a standard gauge could be agreed on the work of handling the wounded would be greatly facilitated, and this agreement would be the more fruitful if such standardisation could be international. Where and by what body such a museum should be erected and controlled is a matter for debate. It has been suggested that the Royal Army Medical College might well undertake the task, as the French Army Medical Service has already done for France. The *Museums Journal* suggests that such a museum might well form an appendage to the Wellcome Medical Museum, or the Royal United Service Museum, Whitehall. But as the whole scheme is still very much in the air, the problem of housing can scarcely be said to have arisen, so much depending on the range of the activities which are to be undertaken.

THE old-fashioned plan of exhibiting stuffed birds in museums has, it is to be hoped, gone for ever. In place of it has come the practice of mounting selected types amid their natural surroundings during the breeding season. In some of the American museums it has become the custom to reproduce not merely the immediate surroundings of the nest, but, by the aid of skilfully painted scenic backgrounds and cunningly concealed artificial lights, also large areas of the general environment. Miles of landscape are apparently surveyed, and the teaching value of the exhibit is thus immensely increased. But the use of these spectacular effects must be strictly limited to this particular purpose, or there is a grave danger of our natural history museums degenerating into peep-shows. An example of the reality of this danger has just been furnished by the Brooklyn Museum, N.Y., where, according to the *Brooklyn Museum Quarterly,* vol. iii., No. 2, half a dozen Cape pigeons and three "whale-birds" have just been mounted as in full flight, and as seen from the deck and through the rigging of "some sailing vessel, off-shore, beating against a fresh Atlantic wind. Models of others, reduced to give the proper perspective, carry the vista back towards the faint sky-line." This is all very pretty, but it is of doubtful value from a scientific point of view. All the information the public will gain from such an exhibit is that petrels fly over the sea!

A PAMPHLET entitled "The Nicolson Observatory Bee-Hive, and How to Use It," by Mr. J. Anderson, issued by the North of Scotland College of Agriculture, is before us. The elephant and the sheepdog might smile sarcastically could they be confronted with Maeterlinck's opinion that the Hymenoptera, "of all the inhabitants of this globe, possess the highest degree of intellect after that of man." When the famous beemaster mentions "the intelligent substitution of flour for pollen, and of an artificial cement for propolis," one is tempted to think of the intellectual vegetables which also readily avail themselves of man's auxiliary devices. Apart from controversy, however, observation of the hive will always make a strong appeal to the curious for its own sake, to the teacher for its value as a lesson in biology, to men of research for the unknown possibilities of suggestiveness. Mr. Anderson's observatory hive claims, apparently with good reason, to make the business of the spy as little objectionable as possible, allowing the bees to perform their various tasks in a perfectly normal way while actually unconscious that they are being observed. His pamphlet describes the latest improvements, with all that is required in the way of superintendence. Among other things, "it is essential that the possessor of a Nicolson observatory should have charge also of one or more full-sized hives."

FOR several years experiments on the effect of overhead electrical discharges on crops have been carried out at Lincluden Mains, Dumfries, by Miss E. C. Dudgeon, with the scientific co-operation of Prof. J. H. Priestley and Mr. I. Jörgensen. The results obtained in 1915 with an oat crop on adjoining plots of 1½ acres each are briefly summarised by Mr. Jörgensen in the October issue of the *Journal of the Board of Agriculture.* The leakage of discharge over the control plot was largely, but not entirely, prevented by the interposition between the plots of a well-earthed wire screen reaching 3 ft. above the level of the charged network. Despite this leakage, the electrified plot showed the remarkable increase of 30 per cent. in grain and 58 per cent. in straw as the presumptive effect of the discharge, which was applied on the average five hours daily for 108 days. The crops were not heavy, but the superiority of the crop on the electrified plot was marked from the earliest stages of growth, and it suffered less from the dryness of the season.

DURING recent years trichloroethylene has been used to a limited extent for the extraction of the oil from soya beans. The residual extracted meal has been disposed of as food for stock, and as trichloroethylene is not poisonous when given in comparatively large doses to cattle little risk would appear to be involved in the use as food of the extracted meal. Cases of poisoning of cattle attributed to soya meal have, however, been brought to the notice of the Board of Agriculture, and the results of their investigations, which are summarised in the October issue of the *Journal,* throw strong suspicion on the meal obtained by the use of trichloroethylene. The cases of poisoning, both on the farms and in the investigations, were limited entirely to cattle, and in no case was a sudden effect produced. Experience with soya extracted with naphtha makes it very improbable that the poisonous principle could have been inherent in the meal. It would appear more probable that it was either a non-volatile impurity present in the trichloroethylene or a product of interaction between the trichloroethylene and some ingredient of the soya beans.

La Nature of October 21 contains an article by M. Alfred Renouard directing attention to the interesting renaissance in the use of natural dyestuffs which the war has brought about. Certain of these dyestuffs, such as indigo, old fustic, logwood, red sandal wood, sapan wood, etc., have continued to be used, some of them in large quantities, in spite of the severe competition of synthetic dyes, and this use has increased greatly owing to the war. Most of the increase is due directly to the war, indigo being required for the cloth for naval uniforms, fustic for khaki, and logwood for black cloth. The area under indigo in India has increased, and special efforts are being made in the British West Indies and elsewhere to increase the output of fustic and logwood. Extremely high prices are being obtained for these dyestuffs, but the producer probably benefits but little from this increase owing to the enormous rise in freight rates. M. Renouard expresses the hope that some means will be found of retaining this increased trade in natural dyestuffs after the war.

AN interesting article in the issue of the *Engineer* for November 10 deals with the new water supply for Guayaquil, chief port and most important city of the Republic of Ecuador. The port stands upon an alluvial plain, on the banks of the river Guayas, and is frequented by ocean-going vessels up to 28 ft. in draught. The absence of a proper system of water supply, combined with ineffective drainage, has militated hitherto against the development of the town, but now that the Government has taken both these matters in hand there is every prospect, despite certain climatic disadvantages, of the attainment of a very serviceable degree of civic sanitation. The total estimated outlay is in the neighbourhood of 2,000,000*l.*, and the work is being carried out progressively, in instalments. A fresh system of water mains is already laid, and a storage reservoir of 6,600,000 gallons capacity is nearing completion. It has not yet been definitely decided whether the source of supply shall be the Daule river, with an intake some twenty miles upstream, or a group of mountain streams in the forests of the Cordillera de los Andes, some sixty miles distant from Guayaquil. The drawbacks in the former case are the pollution arising from settlements along the banks of the river, the high percentage of suspended matter in the water, and the low gradient, which would necessitate pumping. The mountain streams would readily admit of a gravitation supply, and are less likely to be polluted, but the construction of the pipeline would be a heavy initial expense. The Government has both schemes under consideration, and data and statistics are being obtained with a view to an early decision.

OUR ASTRONOMICAL COLUMN.

THE LEONIDS OF 1916.—With the parent comet (1866 I, Tempel) near aphelion an abundant shower of Leonids was not expected, but it was important to ascertain whether the display returned even in a minor character. Mr. Denning writes that on the morning of November 15 he saw only one Leonid in a watch of about an hour between 4 and 5.30 a.m. The next morning was overcast, but on November 17, between 3 and 6.15 a.m., notwithstanding wintry conditions and one of the keenest north-easterly winds experienced in recent years, Mrs. Fiammetta Wilson, of Totteridge, recorded fifteen meteors, including some brilliant objects. There were seven Leonids from a radiant point very sharply defined at $150^\circ+22^\circ$. This position appears to be identical with that usually found on the mornings of November 14 and 15, and apparently favours the view that there is no perceptible change in the place of radiation. But more exhaustive data are required in settlement of this interesting feature.

The brightest meteor seen by Mrs. Wilson was at 3h. 33m. a.m. (November 17). It was equal to Venus, and shot from $215^\circ+58^\circ$ to $245^\circ+57\frac{1}{4}^\circ$—evidently a fine Leonid. Bright meteors of the same shower were seen at 4h. 50m. and 5h. 42m. At 3h. 16m. a large Taurid, comparable with Jupiter, travelled from $188\frac{1}{2}^\circ+57^\circ$ to $204^\circ+48^\circ$. If duplicate observations of any of these objects were obtained at other stations, the records would be valuable for comparison.

THE SOLAR APEX DETERMINED BY MEANS OF BINARY STARS.—The method of determining the solar apex proposed by Bravais in 1843 has until lately not been used by any other investigator, no doubt because it assumes the distances of the stars to be known, and nobody has been inclined to follow Bravais in making them all equal. Some years ago Weersma applied the method to 3616 stars, taking the distances from Kapteyn's tables of mean parallaxes. His result, $267{\cdot}7^\circ+31{\cdot}4^\circ$, was in good accordance with the best previous determinations, though the velocity, 14·9 km., was smaller than the spectroscopic result. In a paper recently published in the Proceedings (*Oversigt*) of the Royal Danish Academy of Sciences, M. Luplau Janssen has applied the method to 180 double stars, the proper motions of which are given in the Preliminary General Catalogue of Boss. Assuming the mass of a binary star equal to that of the sun, well-known formulæ give a value of the parallax called the "hypothetical parallax." Hertzsprung has shown (*Astronomische Nachrichten* 4543) that where the annual change of position angle and distance is known, it is possible to find a minimum value of this hypothetical parallax of a binary star. From a comparison of thirty-six values of parallaxes actually measured with the computed values of the minimum hypothetical parallax M. Janssen finds that the latter may be put equal to half the real parallax. On this assumption he finds the apex to be $264{\cdot}5^\circ+26{\cdot}1^\circ$, and the velocity equal to 17·15 km. per sec. This result is in surprisingly good accordance with the best recent determinations, and this shows at any rate that the hypothetical minimum parallax is a quantity which is not without some value where there is no satisfactory value of the parallax resulting from measures.

SPECTRUM OF THE NEBULA ABOUT RHO OPHIUCHI.—At the Lowell Observatory, Dr. V. M. Slipher has lately attempted to photograph the spectrum of the remarkable nebula in the region of ρ Ophiuchi (*Popular Astronomy*, vol. xxiv., p. 542). A single-prism spectrograph of high light-power was used, and an image was formed on the slit by a simple lens of 20 cm. focal length. The total exposure, on four nights, was twenty hours, and by comparison with the exposures for direct photographs given by Barnard, it was estimated that this would give a good record of the spectrum if of the bright-line type, or would give a weak impression if the spectrum were continuous. The plate obtained was of the latter type, the spectrum of the nebula appearing faintly on either side of that of the star. So far as can be judged from the photograph, the spectrum is like that of the star about which the nebula clusters, and Dr. Slipher regards this as an indication that the nebula shines by reflected light, as he previously found reason to believe to be the case with the nebulæ in the Pleiades. In both these regions of the sky faint stars are conspicuously deficient in number, and it is suggested that their apparent scarcity may be due to their obscuration by nebulæ which may be otherwise invisible.

BRITISH INDUSTRY AND THE WAR.

THE advice of a recent ex-Minister of State that we might well leave after-the-war conditions to take care of themselves finds little response in the world of industry, whether in regard of employers or employed, who are alike viewing with deep concern the industrial and commercial problems that will surely arise on the advent of peace. This finds clear expression in a valuable memorandum issued in June last by the Garton Foundation entitled "The Industrial Situation after the War," which is fully and sympathetically further considered in the *Quarterly Review* for October by a member of the group which prepared it. This highly important memorandum has been drawn up by a group of men representative of the capitalist and employing classes, of organised labour, as well as by men familiar with finance, economics, and administration. It has further been circulated to, and discussed in draft by, large employers, trade union officials, and experts on social and economic questions with a view to their criticisms and suggestions. It is now published in the hope of stirring both employers and employed to action. The industrial problem, it declares, was with us before the war. The dangers of labour unrest and the cry for increased efficiency are